Measuring China's Economy

An inside glimpse of capital investment, deflation and, of all things, a strange agricultural productivity boom.

BY ANDY XIE

China's growth follows the typical pattern of a developing country. The agriculture sector's share in GDP declined to 16 percent from 27 percent between 1990 and 2000. The industrial sector's share has expanded with the economy. The agriculture sector is growing at half the speed at which the economy is expanding. Its share in the economy is still declining by 0.6 percentage points per annum. By 2010, China's agricultural sector's share in the economy could dip below 10 percent.

Figure 1

Changing Economic Structure (%)

	Growth 1990-2000	Deflator	Share in GDP 1990	Share in GDP 2000
GDP	262	184		
Primary	145	195	27.0	15.9
Secondary	357	165	41.6	50.9
Service	238	215	31.3	33.2

Source: *China Statistical Yearbooks and Morgan Stanley Research*

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The next phase of structural shift is from industry to service. This process hasn't begun. The reason is that Chinese households have low wealth levels and tend to minimize consumption in favor of wealth accumulation. As restructuring improves and capital returns and makes wealth accumulation easier to achieve, consumption preference should increase. The service sector's share in the economy should rise significantly. Most of the expected reduction in the agricultural sector's share in GDP in this decade should go to the service sector.

China is in an early stage of capital accumulation and, therefore, is experiencing rapid labor productivity growth. As the technology embodied in capital is much more productive than just one decade ago, China is experiencing faster labor productivity growth than perhaps any other country.

Figure 2

Labor Force Redistribution (million)

	1990	2000	2001
Population	1,143	1,266	Est. 1,278
Labor Force	645	712	730
Employment	639	712	
Primary	365	330	
Industry/Service	275	382	

Source: China Statistical Yearbooks

China has about 735 million people or 58 percent of the population in the labor force. The official unemployment figure was 6.8 million in the urban sector. China doesn't recognize a rural unemployment rate. Since Chinese labor is so underutilized overall, the only meaningful figure is non-agricultural employment. This figure was 382 million in 2000 or 54 percent of the labor force, up from 43 percent in 1990. China created 107 million jobs in the 1990's. If the current trend continues, non-agricultural employment could rise to 62 percent of the total labor force by 2010. The labor market would be in much better shape, but would still be far from a full employment situation. China's labor market should achieve full employment only between 2025 and 2030.

Figure 3

Labor Productivity (% change p.a.)

	Output/ Worker (Rmb) 1990	Output/ Worker (Rmb) 2000	Deflator (%)	Avg. Labor Productivity (% change p.a.)
Total	2,902	12,566	184	8.9
Primary	1,377	4,309	195	4.8
Industry/Service	4,923	19,701	183	8.1

Source: Morgan Stanley Research

China's non-agricultural economy experienced an 8.1 percent annual growth rate in labor productivity between 1990 and 2000. The agricultural sector experienced 4.8 percent expansion during the same period. The whole economy had a higher growth rate of 8.9 percent due to steady redistribution of labor from the low productivity rural sector to industry and service sectors. Because the output of a worker in industry and service is 4.6 times that of a worker in agriculture, every one percentage point of labor redistributed from agriculture to industry/service improves labor productivity by 1.2 percentage points.

Total factor productivity growth is the Holy Grail of economic efficiency. It indicates how much more output an economy generates with the same amount of capital and labor. Rapid growth of labor productivity could be attributed to more investment, that is, more machines for each worker. This so-called capital deepening process is the most important factor in labor productivity.

The basic model for measuring total factor productivity is based on Robert Solow's neoclassical growth model. Total factor productivity is equal to total output growth rate minus capital growth rate times its share in GDP, and minus labor growth rate times its income share in GDP. The sum of labor and capital's share in income is one. This number should be known in economies with good income data. Labor growth data are usually well documented. However, data on capital stock are usually hard to come by. Academic studies of TFP usually focus on estimating capital stock.

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China doesn't have good income data. Data on capital stock are scarcer. Instead, we carry out a sensitivity analysis to try to guesstimate indirectly the growth rate for capital stock and its income share in GDP. Figure 4 shows the range of TFP rates in relation to a range of annual capital stock growth rates and the income share of this in the economy in the 1990's.

Figure 4

Annual TFP Sensitivity Analysis (%)

Industry/Service			
K Growth	10	15	20
K Inc Share			
25	6.8	5.6	4.3
40	5.8	3.8	1.8
50	5.2	2.7	0.2
Agriculture			
K Growth	5	10	15
K Inc. Share			
10	4.2	3.7	4.2
20	3.6	2.6	1.6
30	3.0	1.5	0.0

Source: Morgan Stanley Research

Capital stock should have grown faster than output in China. One important indicator is that the investment to GDP ratio has been increasing. The industry/service output ratio grew by 10.7 percent between 1990 and 2000. Hence, we can be reasonably sure that capital stock in the modern sector grew by more than 10.7 percent on average.

The upper limit in capital stock growth could be derived from financial asset growth, especially household bank deposits. Bank loans have been the dominant force in financing. Retained earnings on average have probably only offset capital depreciation. While the export sector has been profitable, the state-owned enterprises have run up huge amounts of bad debt. They have probably offset each other. FDI contributed to about 8.5 percent of total capital formation between 1990 and 2000, and wasn't the major force in capital increase. Hence, household deposit increase relative to existing capital should give us an upper limit for capital stock growth.

Household deposits were rising about 42 percent faster than industry/service output between 1990 and 2000. If we use the same deflator for this as for industry/service output, household deposits grew 15 percent in real terms in this period. Total household deposits are still less than 100 percent of GDP today and should be less than the capital stock in the industry/service sector. Hence, the capital stock in the modern sector couldn't have grown at a rate above 15 percent per annum.

Capital's income share in the economy ranges from 25 percent in the United States to probably 40 percent in Hong Kong. China is probably somewhere between. I would put it at close to 40 percent. The TFP for the modern sector should be around 4 percent.

Capital stock in the agricultural sector should also have grown faster than its output but must be below 10 percent, as capital allocation for the agricultural sector has been consistently below its share in GDP. The share of capital in the agricultural sector's income is probably less than half of that for the modern sector. These two factors lead us to believe that the TFP for China's agricultural sector has also been around 4 percent.

It comes as a shock to find that productivity in the agricultural sector has been growing as fast as in the modern sector. A good explanation is that the technology for agriculture has been highly effective in generating high, value-added output. Greenhouse technology and new seeds have been instrumental in improving agricultural productivity. The declining cost of technology may have contributed to the high TFP rate. Since China is mainly a technology user rather than producer, the declining price of technology improves China's terms of trade, and hence, its TFP.

Another factor in China's productivity story is network economies of scale. China is a large country, and it is connected through construction of networks such as transportations, communication, energy and water supply. The externalities from such investments are potentially large.

The first implication from this analysis is that China must grow much faster than 4 percent to have employment growth at all. The current implicit target of 7 percent for its GDP growth rate may not be sufficient. Indeed, the 8.9 percent labor productivity growth rate implies the potential GDP growth rate for China is 10 percent, as the labor force is growing at about one percent.

The second implication is that deflation should not be a major problem. With 4 percent TFP, the economy should be able to handle quite a bit of deflation without distress. Indeed, we observe this in the export, telecom, IT, and property sectors. However, there is considerable stress in the state sector. The explanation could be that the state sector lags far behind the non-state sector in generating TFP. Hence, China should try to make the state sector as efficient as the rest. This could allow China to live with deflation without a detrimental effect on growth.

The third implication is that the agricultural sector could be more profitable than the modern sector. Its productivity is rising at the same speed as the modern sector. Its labor force is shrinking, but output is expanding. The commercial potential of the agricultural sector should be huge.

The fourth implication is that China's export prices could continue to decline as the benefit from TFP is passed on to consumers. Deflation in China should continue to translate into a decline in the relative price of tradable to non-tradable goods.◆